Ontario Building Code: Egress and Exiting

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Terminology

- Egress
- Access to exit
- Exit
- Means of egress
- Exit discharge
- Exit level
- Exit storey

Outline

1. OBC terminology
Outline

1. OBC terminology
2. Code provisions
Origin?

- History
- Principles
- Fundamentals

Outline

1. OBC terminology
2. Code provisions
3. Factors influencing egress and exit design

Design Options

- Options?
- Exits...
  (a) exterior doorway,
  (b) exterior passageway,
  (c) exterior ramp,
  (d) exterior stairway,
  (e) fire escape
  (f) horizontal exit,
  (g) interior passageway,
  (h) interior ramp, or
  (i) interior stairway.
1. OBC terminology
2. Code provisions
3. Factors influencing egress and exit design
4. Design options

New to 2014

• Future?
• New exit signs
• Elevators as exits
• ?

Outline

1. OBC terminology
2. Code provisions
3. Factors influencing egress and exit design
4. Design options
5. New for 2014
1. OBC terminology
2. Code provisions
3. Factors influencing egress and exit design
4. Design Options
5. New for 2014

Factors Influencing Egress and Exit Design

- History
  - Large fires
  - Response from fire protection community
- Egress time line
- Human behaviour
- “Safe” conditions
- OBC Objectives
Factors Influencing Egress and Exit Design

- History of Codes and egress design
- Knowledge comes from:
  - Experience
  - Research

Triangle Shirtwaist Factory, NYC, 1911

- 8th, 9th, and 10th floors;
- 500 employees
- Fire origin: bin of rags on 8th floor
- Large quantities of fabric
- 8th floor: one exit locked, when unlocked, swung against direction of exit travel
- 10th floor occupants: escaped to roof and then across to an adjacent building
- 9th floor occupants: not warned, exterior fire escape collapsed (fire exposure)

Triangle Shirtwaist Factory, NYC 1911

- 147 persons died
- Contributing factors:
  - Noncombustible construction required for building >150 ft tall,
  - building was only 135', combustible constriction
  - 3 exits required, 2 interior provided plus exterior fire escape
- Results:
  - Commissions and investigations
  - New York City Fire Prevention Bureau (first in US)
  - NFPA expanded application to include life safety
Centre Block, Ottawa 1916

- Date: Feb 3, 1916
- Origin – wastebasket in Reading Room, wood paneled and paper filled room
- House of Commons had to be evacuated
- Some women attempted to reclaim their fur coats
- Human chain to carry furniture, files and artwork
- Building destroyed in 12 hours
- Library of Parliament saved
- 7 people died

Cocoanut Grove Nightclub
Fire, Boston, 1942

- Designed for 600
- Actual 1000 persons
- One storey plus basement
- Fire: basement wall finishes
- Basement:
  One exit from basement to ground
- Ground floor:
  One other exit at ground floor locked
  Main exit was revolving doors
- Ground floor occupants (dining room) only familiar with the main entrance,
  Adjacent lounge, exit door swung against direction of travel
- 492 persons died
- Contributing factors:
  Exceeded occupant load
  Combustible finishes
  Exits hidden or locked
- Results:
  Led to modern exit capacity calculations
  New requirements for loose seating in assembly occupancies
  Exit lighting requirements
World Trade Centre Bombing, NYC, 1993

- 1000 lb bomb on B2 level
- Impacted fire and life safety systems
- 240 elevators out of service
  - Impact on firefighter access
- 6 people died, 1042 injured

Results:
- 1598 person survey to fire safety organization
  - >25% response
- Ave. start of evacuation: 5 minutes
- Previous fire drill experience was not considered adequate
- Other studies:
  - Stairwells movement
• January 27, 2013
• 241 killed, at least 168 injured
• Origin: Insulation foam caught fire when singer of a band held a firework close to the ceiling
• Only one exit door.
• Escape routes and lighting found to be inadequate
• Licensed for 800; Actual 1000 persons
• 2nd most devastating fire in Brazil after the Great North American Circus fire (Dec 1961) (503 killed)

• At least 180 bodies removed from washrooms
• Many injured by crush at front door
• Security guards apparently held people inside
• Most deaths from smoke inhalation
• Some from burns

• Triangle shirtwaist Factory 2011
• Centre Block Parliament Hill 1916
• Cocoanut Grove Nightclub 1942
• Ringling Brothers Circus 1944
• Beverly Hills Supper Club 1977
• MGM Grand Hotel 1980
• 2 Forest Lane Toronto 1995
• WTC Bombing 1993
• WTC Collapse 2001
• Station Nightclub 2003
• Cook County Administration Building 2003
Factors Influencing Egress and Exit Design

- History
  - Large loss fires
  - Response from fire protection community
- Egress time line
- Human behaviour
- “Safe” conditions
- OBC Objectives

Factors Influencing Egress and Exit Design

- Code perspective:
  - Evacuation
  - Emergency evacuation
- Two components to evacuation time
  1. Before we start to move
     - “Pre-movement” time
  2. Travel time

Factors Influencing Egress and Exit Design

[Diagram showing the process of evacuation with different stages and time lines.]

- Perception
- Motivation
- Action
- Delay time to start evacuation
- Available escape time
- Evacuation line
- Time
- Ignition
- Detector
- Alarm, cue, or warning
- Evacuation completed
Factors Influencing Egress and Exit Design

- Pre-movement time
  - (from time 0 to start of movement)
  - Also called delay time
  - A few seconds to several minutes
  - Influenced by:
    - Effectiveness of fire cues
    - Effectiveness of training
    - Time of day, weather etc.

Factors Influencing Egress and Exit Design

- Pre-movement time
  - Time to notification
  - Reaction time
  - Pre-evacuation activity time
  - Travel or movement time

Factors Influencing Egress and Exit Design

- Time to notification
  - Time 0:
    - time when ignition occurs
  - to:
    - time that alarm sounds or
    - people sense the fire cues
Factors Influencing Egress and Exit Design

- Non-fire alarm cues:
  - Sight or smell of smoke
  - Heat
  - Sight of flames
  - Sound of glass breaking
- We can estimate time to notification
  - Through calculation
  - Experimental data
- Time to notification can be very long

Factors Influencing Egress and Exit Design

- Shorten by selection of the “right” detection system
  - Ionization versus photoelectric smoke detectors
  - Sprinkler systems (response time index)
  - Placement of devices
  - Polling and computing time within fire alarm systems
- No fire alarm system?
  - Best detector?
  - Awake and alert persons are the “best” detector

Factors Influencing Egress and Exit Design

- Reaction time
  - Time for an occupant to perceive the alarm or fire cue and decide to take action
    - Wake up
    - Identify the sounds, smells or other
    - Recognize a fire alarm signal
    - Decide to leave
Factors Influencing Egress and Exit Design

- Alertness... intoxication
- Age... young and elderly
- Level of training... influences decision to leave
- Familiarity with surroundings
- Commitment to a task
  - Airport
  - Lecture environment

Factors Influencing Egress and Exit Design

- Response to alarm sounds
  - Old “bell” style sound versus temporal pattern
  - Recognition of sound plus sense of urgency
  - Audibility
  - Signal only or signal plus voice
  - Intelligibility of voice

Factors Influencing Egress and Exit Design

- Pre-Evacuation Activity Time
  - Elapsed time while an occupant prepares to leave
    - Dwelling units: dress, gather children, valuables
    - Hotel occupants: pack or gather valuables
    - Office: shut off equipment, lock files, grab coat or purse
    - Industrial: safe shut down of equipment
  - Could also be a person ignoring an alarm... result of nuisance alarms
Factors Influencing Egress and Exit Design

• Longer pre-movement time; more efficient that egress systems have to be

Factors Influencing Egress and Exit Design

• Travel time
  • Time to travel to place of safety
  • Architectural design has influence

Factors Influencing Egress and Exit Design

• Influences on travel speeds
  • Number of people
  • Width
  • Level of lighting
  • Moving through smoke
  • Movement around obstructions/through doors
  • Handrails within easy reach on stairs/ramps
  • Roughness of wall surfaces
  • Riser height and tread depth
Factors Influencing Egress and Exit Design

- Number of people

Factors Influencing Egress and Exit Design

- Width affects capacity
- Can create queuing
- Flow constraint
  \[ F_c = F_s \times W_e \]
  - Where
    - \( F_c \): Flow rate at exit door (persons/s)
    - \( F_s \): Specific flow (persons/s/m) – 1.3
    - \( W_e \): Effective width (m)

Factors Influencing Egress and Exit Design

- Moving through smoke
Factors Influencing Egress and Exit Design

- Stair rise and run
Factors Influencing Egress and Exit Design

- Travel speed
  - Different people move at different speeds
  - (i.e., children, people with disabilities, etc.)
  - Unimpeded on flat surface: 1.19 m/s
  - Unimpeded on stairs: 0.85 to 1.05 m/s

Factors Influencing Egress and Exit Design

- History
  - Large loss fires
  - Response from fire protection community
  - Egress time line
- Human behavior
- “Safe” conditions
- OBC Objectives

Factors Influencing Egress and Exit Design

- Decisions during the pre-movement time
- UK versus NA results
  - UK: 1st action to fight the fire
  - NA: 1st action to notify others
- Women versus men
  - Women: got family and leave building
  - Men: investigate fire
Factors Influencing Egress and Exit Design

• Decision to leave…
  • Commitment

Factors Influencing Egress and Exit Design

• Commitment to task…
  • Airport environments
  • Paid events
  • Waiting in line

Factors Influencing Egress and Exit Design

• Decision to leave…
  • Commitment
  • Familiarity
Factors Influencing Egress and Exit Design

- Station Nightclub fire, Rhode Island
- 100 people died
- 11:07 PM, 2003
- Packed club with live band
- Pyrotechnics ignited foamed plastic wall linings
- Urethane and polyethylene foam

- Flames thought to be part of the act
- Band played for 20 seconds while fire engulfed set
- Event was being filmed, cameraman continued to film
- Most people tried to exit the way they had come in

Factors Influencing Egress and Exit Design

- Office environment
- What do you do if the fire alarm goes off while you are in a hotel?
Factors Influencing Egress and Exit Design

- Decision to leave...
  - Commitment
  - Familiarity
  - Training
  - Taking the lead versus waiting for others to make the first move (lemming effect)
  - Reliability of fire alarm

Factors Influencing Egress and Exit Design

- Training
  - Know location of exits
  - Recognize alarm signal
  - Know what to do
  - Trained staff can give effective direction....

Factors Influencing Egress and Exit Design

- Choice of exit?
  - Which exit will you chose?
  - If doors are front of you?
    - In front
  - If doors behind?
    - door that you came in
Factors Influencing Egress and Exit Design

• Occupant Characteristics:
  • Age
  • Agility
  • Influence on travel time
  • Also influence reaction time, and pre-evacuation activity time

Factors Influencing Egress and Exit Design

• Occupant characteristics
  • Person with hearing disabilities
  • Mobility disabilities
  • Temporary disabilities

Factors Influencing Egress and Exit Design

• History
  • Large loss fires
  • Response from fire protection community
  • Egress time line
  • Human behaviour
• “Safe” conditions
• OBC Objectives
Factors Influencing Egress and Exit Design

- “Safe” exits
- Tenability conditions
  - Toxicity (CO, CO₂, O₂, HCl, H₂S…)
  - Visibility
  - Heat

Factors Influencing Egress and Exit Design

- Fire and exit modeling:
  - ASET: Available safe egress time
    - Time to untenable conditions
  - RSET: Required safe egress time
    - Time for occupants to reach place of safety
  - ASET > RSET

Factors Influencing Egress and Exit Design

- Tenability assessment
- Not part of Canadian Codes
  - Objective based Codes and alternative solutions
  - Performance is established by Division B provisions
    - i.e. 45 metre travel distance
    - Does not make provision for analysis of tenability
Factors Influencing Egress and Exit Design

- True performance design – ASET/RSET
  - Design fire
    - What’s burning
    - For how long
  - Smoke movement
  - Factors influencing smoke movement
- Decide on tenability criteria
- Egress analysis
- Highly dependent on accuracy of assumptions, scenarios, people characteristics

Factors Influencing Egress and Exit Design

- History
  - Large loss fires
  - Response from fire protection community
- Egress time line
- Human behaviour
- “Safe” conditions
- OBC Objectives

Safety Objectives
An objective of this Code is to limit the probability that, as a result of the design or construction of a building, a person in or adjacent to the building will be exposed to an unacceptable risk of injury due to
- OS 1.5 fire caused by persons being delayed in or impeded from moving to a safe place during a fire emergency.
- OS 3.1 hazards caused by tripping, slipping, falling, contact, drowning or collision.
1. Factors influencing egress and exit design
2. OBC terminology
3. Code provisions
4. Design options
5. New for 2014

OBC Terminology

- Means of egress
- Access to exit
- Exit
- Exit discharge
- Horizontal Exit
- Exit level
- Exit storey

OBC Terminology

- Aisles
- Corridors
- Fixed Seating
  - Access aisleway
  - Row
  - Cross aisle
1.4.1.2. Defined Terms
(1) Each of the words and terms in italics in this Code has,
(a) the same meaning as in subsection 1 (1) of the Act, if not defined in clause (b), or
(b) the following meaning for the purposes of this Code and, where indicated, for the purposes of the Act:

1.4.1.1. Non-defined Terms
(1) Definitions of words and phrases used in this Code that are not included in the list of definitions in Articles 1.4.1.2. and 1.4.1.3. and are not defined in another provision of this Code shall have the meanings that are commonly assigned to them in the context in which they are used, taking into account the specialized use of terms by the various trades and professions to which the terminology applies.

Egress and exiting
- Three components
  - Access to exit
  - Exit
  - Exit discharge
- Combined: Means of egress
OBC Terminology

Means of egress includes exits and access to exits and means a continuous path of travel provided for the escape of persons from any point in a building or in a contained open space to,
(a) a separate building,
(b) an open public thoroughfare, or
(c) an exterior open space that is protected from fire exposure from the building and that has access to an open public thoroughfare.

Egress and Exiting

- Exit / access to exit / egress

OBC Terminology

Access to exit means that part of a means of egress within a floor area that provides access to an exit serving the floor area.
OBC Terminology

- Exit / access to exit / egress

Exit means that part of a means of egress, including doorways, that leads from the floor area it serves to:
  - a separate building,
  - an open public thoroughfare or
  - an exterior open space protected from fire exposure from the building and having access to an open public thoroughfare.
OBC Terminology

- Exit / access to exit / egress

- Exit discharge
- Not defined
- Included in definition of “exit”
**Exit** means that part of a means of egress, including doorways, that leads from the floor area it serves to:
- a separate building,
- an open public thoroughfare or
- an exterior open space protected from fire exposure from the building and having access to an open public thoroughfare.
Horizontal exit means an exit from one building to another by means of a doorway, vestibule, walkway, bridge or balcony.

- Adjacent building is deemed to be safe

Exit level means the level of an exit stairway in a building at which an exterior exit door or exit passageway leads to the exterior.

Exit storey means a storey having an exterior exit door in a building governed by Subsection 3.2.6. of Division B.

- Exit level
OBC Terminology

- Exit level
- Sloped Site

OBC Terminology

- Exit storey
- “Lowest” Exit storey

Outline

1. Factors influencing egress and exit design
2. OBC terminology
3. Code provisions
4. Design options
5. New for 2014
Code Requirements

- Reading the Code
  - “or” and “and”
  - Most specific provision takes precedence over more general provision
- Exceptions
  - “...Except as required by...”
    – Exception takes precedence for areas covered by exception
  - “...Except as provided in...”
    – Either general rule or exception can be applied
  - “...Except as permitted by...”
    – Either general rule or exception can be applied

Code Requirements

- Access to exits
  - Applies within a floor area
  - Subsection 3.3. “Safety within Floor Areas”
    - Number of egress doors
    - Location of egress doors
    - Separation of egress doors
    - Capacity of egress
    - Door swing
    - Sliding doors
    - Design features

Egress and Exiting

- Number of egress doors
  - Similar to exits
  - Based on:
    - area
    - travel distance, and
    - occupant load
3.3.1.3. Means of Egress
- Set of general rules/catch all
- Defines scope for access to exits
  - Occupancy specific requirements: 3.3.2. to 3.3.5.
  - Roofs, terraces, etc.
  - Service spaces
  - Multiple tenant floor areas

(3) Means of egress shall be provided from every roof that is intended for occupancy, and from every podium, terrace, platform or contained open space.
Code Requirements

(3) Means of egress shall be provided from every roof that is intended for occupancy, and from every podium, terrace, platform or contained open space.

3.3.1.3.(2) Podiums, terraces, platforms or contained open spaces
• Treat as a room for number based on area, travel distance, occupant load

3.3.1.3.(4) At least two separate means of egress shall be provided from a roof, used or intended for an occupant load more than 60, to stairs designed in conformance with the exit stair requirements of Section 3.4.

• Doesn’t say that the exit stairs have to be at roof level
3.3.1.3. (5) A rooftop enclosure shall be provided with an access to exit that leads to an exit, (a) at the roof level, or (b) on the storey immediately below the roof.

3.3.1.3. (6) A rooftop enclosure that is more than 200 m² in area shall be provided with at least 2 means of egress.

Code Requirements

Multi-tenant floors:

(8) Except as required by Sentence 3.3.4.4.(9) and permitted by Sentences 3.3.4.4.(6) and (7), each suite in a floor area that contains more than one suite shall have, (a) an exterior exit doorway, or (b) a doorway, (i) into a public corridor, or (ii) to an exterior passageway.

Code Requirements

- Interior public corridor
- Could be an exterior passageway
- On the exit storey, door to the exterior
Except as permitted by this Section and by Sentence 3.4.2.1.(2), at the point where a doorway referred to in Sentence (8) opens onto a **public corridor or exterior passageway**, it shall be possible to go in opposite directions to each of 2 separate **exits**.
Except as permitted by this Section and by Sentence 3.4.2.1.(2), at the point where a doorway referred to in Sentence (8) opens onto a public corridor or exterior passageway, it shall be possible to go in opposite directions to each of 2 separate exits.

• 3.4.2.1.(1) provides for one exit in some cases.
(10) **Means of egress from a roof for personnel servicing roof top equipment or for a below ground service room that is not normally occupied, is permitted to be provided by stairways or fixed ladders.**
(10) Means of egress from a roof for personnel servicing roof top equipment or for a below ground service room that is not normally occupied, is permitted to be provided by stairways or fixed ladders.

3.3.1.4. Public Corridor Separations

- Some significant changes in recent years
- Used to apply between public corridors and remainder of the building
- Fire resistance ratings relaxed in some cases

(1) Except as otherwise required by this Part or as permitted by Sentence (4), a public corridor shall be separated from the remainder of the storey by a fire separation.
 Except as permitted by Sentence (3) and Clauses (4)(a) and (b), the fire separation between a public corridor and the remainder of the storey shall have a fire-resistance rating not less than 45 min.
(3) If a storey is sprinklered, no fire-resistance rating is required for a fire separation between a public corridor and the remainder of the storey … provided the corridor does not serve a care or detention occupancy or residential occupancy.

(4) No fire separation is required in a sprinklered floor area between a public corridor and,

(a) except … the remainder of a storey provided the travel distance from any part of the floor area to an exit is not more than 45 m.,

(b) a room or suite provided the public corridor complies with Sentence 3.3.1.9.(6) and Clause 3.4.2.5.(1)(d), or
No fire separation is required in a sprinklered floor area between a public corridor and, or (c) a space containing plumbing fixtures required by Subsection 3.7.4. provided the space and the public corridor are separated from the remainder of the storey by a fire separation that has a fire-resistance rating not less than that required between the public corridor and the remainder of the storey.

3.3.1.5.(1) Except for dwelling units, a minimum of 2 egress doorways located so that one doorway could provide egress from the room or suite as required by Article 3.3.1.3. If the other doorway becomes inaccessible to the occupants due to a fire that originates in the room or suite, shall be provided...
3.3.1.5.(1) Except for dwelling units, a minimum of 2 egress doorways... located so that one doorway could provide egress from the room or suite as required by Article 3.3.1.3... if the other doorway becomes inaccessible to the occupants... due to a fire that originates in the room or suite,... shall be provided...
3.3.1.5.(1) … a minimum of 2 egress doorways …, shall be provided for every room and every suite,
(b) intended for an occupant load more than 60,
(c) in a floor area that is not sprinklered if,
  (i) the area of a room or suite is more than the value in Table 3.3.1.5.A.,
  or
  (ii) the travel distance within the room or suite to the nearest egress doorway, is more than the value in Table 3.3.1.5.A.,
3.3.1.5.(1) … a minimum of 2 egress doorways …, shall be provided for every room and every suite.

(d) in a floor area that is sprinklered and does not contain a high hazard industrial occupancy if,

(i) the travel distance to an egress doorway is more than 25 m, or

(ii) the area of the room or suite is more than the value in Table 3.3.1.5.B., or

(e) where the area of the room is more than 100 m² and it is a hazardous classroom in elementary or secondary school.

| Group D, sprinklered, 250 m², 15 m travel distance, 15 people |
| Group D, not sprinklered, 250 m², 20 m travel distance, 15 people |
| Group A, not sprinklered, 250 m², 20 m travel distance, 75 people |
| Group A, sprinklered, 250 m², 20 m travel distance, 75 people |
| Group F3, sprinklered 300 m², 20 m travel distance, 15 people |
| Group F3, not sprinklered, 300 m², 20 m travel distance, 15 people |
| Group B, not sprinklered, 100 m², 10 m travel distance, 10 people |
| Group F1, sprinklered, 20 m², 0 m travel distance, 10 people |
(2) Except for a mezzanine within a dwelling unit, every mezzanine that is not required to terminate at a vertical fire separation in Article 3.2.8.2. shall have 2 egress facilities placed in such a manner that one facility could provide egress from the mezzanine if the other facility becomes inaccessible to the occupants of the mezzanine due to a fire that might originate in the room or suite in which the mezzanine is located,....
(2) Except for a mezzanine within a dwelling unit, every mezzanine … shall have 2 egress …

(a) where the occupancy of the mezzanine, room or suite is classified as Group F, Division 1,
(b) where the mezzanine is intended for an occupant load of more than 60 persons,
(c) in a floor area that is not sprinklered if,
   (i) the area of a mezzanine is more than the value in Table 3.3.1.5.A., or
   (ii) the travel distance to an egress doorway or an egress facility is more than the value in Table 3.3.1.5.A., or
(d) in a floor area that is sprinklered if,
   (i) the travel distance to an egress doorway or an egress facility is more than 25 m, or
   (ii) the area of the mezzanine is more than the value in Table 3.3.1.5.B.

(3) For the purpose of Clause (2)(c) and (d),
(a) if the room or suite in which the mezzanine is located is permitted to have one egress doorway, the travel distance is measured from any point on the mezzanine to that doorway, or
For the purpose of Clause (2)(c) and (d),
(b) if the room or suite in which the mezzanine is located is required to have more than one egress doorway, the travel distance is measured from any point on the mezzanine to the nearest egress facility leading from the mezzanine.
3.3.1.7. Protection on Floor Areas with a Barrier-Free Path of Travel

(1) Except as provided in Sentences (2) and (3), every floor area above or below the first storey that has a barrier-free path of travel shall....

(3) The requirements of Sentences (1) and (2) are waived when the building is sprinklered.
1. (a) be served by an elevator,
   (i) conforming to Sentences 3.2.6.5.(4) to (6),
   (ii) protected against fire in conformance with Clause 3.2.6.5.(3)(b) or (c), and
   (iii) in a building over 3 storeys in building height, protected against smoke movement so that the hoistway will not contain more than 1% by volume of contaminated air from a fire floor during a period of 2 h after the start of a fire, assuming an outdoor temperature equal to the January design temperature on a 2.5% basis determined in conformance with Supplementary Standard SB-1, or

2. (b) be divided into at least 2 zones by fire separations conforming to Sentences (4) to (6) so that,
   (i) persons with physical disabilities can be accommodated in each zone,
   (ii) the travel distance from any point in one zone to a doorway leading to another zone shall be not more than the value for travel distance permitted by Sentence 3.4.2.5.(1) for the occupancy classification of the zone, and
   (iii) a barrier-free path of travel is provided to an exit.

3. In residential occupancies, the requirements of Sentence (1) are waived if a balcony conforming to Sentence (7) is provided for each suite, except for suites on the storey containing the barrier-free entrance described in Article 3.8.1.2.

   • But many residential occupancies now sprinkled
3.3.1.13. Ramps and Stairways

(1) Except as permitted by Sentence (2), Article 3.3.4.7, and Subsection 3.3.2.

ramps and stairways that do not serve as exits... shall conform to...requirements for exits

(2) Ramps and stairways that do not conform to the requirements of Sentence (1) and are intended only for occasional use for servicing equipment and machinery are permitted,

(a) to serve service rooms and service spaces, and
(b) in industrial occupancies.

3.3.1.9. Corridors

- Width
- Obstructions of required width
- Occupancies in corridors
- Dead end conditions

- Public corridors
- Corridors used by the public
- Corridors serving classrooms
- Corridors serving patients’ or residents’ sleeping rooms
- Aisles
Code Requirements

- Corridor versus aisle
- Corridor
  - Hard walls
- Aisle
  - Open concept
• Public corridors
• Corridors used by the public
• Corridors serving classrooms
• Corridors serving patients’ or residents’ sleeping rooms

3.3.1.9. Corridors
(1) The minimum width of a public corridor shall be 1100 mm.
Except as required by Sentences 3.3.3.3.(2) and (3), the minimum unobstructed width shall be 1100 mm for every:

(a) corridor used by the public,
(b) corridor serving classrooms, and
(c) corridor in a Group B, Division 2 or 3 occupancy where
   the corridor
   (i) serves a service room,
   (ii) serves an administrative area,
   (iii) will not be used by non-ambulatory outpatients, or
   (iv) will not be used by non-ambulatory residents.

Except as permitted by Sentence (4), obstructions located within 1980 mm of the floor shall not project more than 100 mm horizontally in a manner that would create a hazard for a person with a visual disability traveling adjacent to the walls in:

(a) an exit passageway,
(b) a public corridor,
(c) a corridor used by the public,
(d) a corridor serving classrooms, or
(e) a corridor serving patients' or residents' sleeping rooms in a Group B, Division 2 or Division 3 occupancy.
(3) Except as permitted by Sentence (4), obstructions located within 1980 mm of the floor shall not project more than 100 mm horizontally in a manner that would create a hazard for a person with a visual disability traveling adjacent to the walls in,
Code Requirements

166 1980 mm

167 Except as permitted by Sentence (4), obstructions located within 1980 mm of the floor shall not project more than 100 mm horizontally in a manner that would create a hazard for a person with a visual disability traveling adjacent to the walls in,

168 The horizontal projection of an obstruction referred to in Sentence (3) is permitted to be more than 100 mm provided the clearance between the obstruction and the floor is less than 680 mm.
(5) If a corridor contains an occupancy, the occupancy shall not reduce the unobstructed width of the corridor to less than its required width.
(6) If a public corridor conforming to Clause 3.4.2.5.(1)(d) contains an occupancy,

(a) the occupancy shall be located so that for pedestrian travel there is an unobstructed width not less than 3 m at all times adjacent and parallel to all rooms and suites that front onto the public corridor, and

(b) the combined area of all occupancies in the public corridor shall be not more than 15% of the area of the public corridor.
Code Requirements

(7) Except as provided in Sentence 3.3.3.3.(1), a dead end corridor shall conform to Sentences (8) to (14).

- Dead end corridor provisions
  - Assembly
  - Residential
  - Business and personal services
  - Mercantile
  - Low and medium hazard industrial
  - High hazard industrial

Code Requirements

Assembly occupancy
(8) A dead end corridor is permitted in an assembly occupancy where there is a second and separate egress doorway from each room or suite not leading into a dead end corridor.
In a residential occupancy, except for corridors served by a single exit as described in Sentence 3.3.4.4.(7) ... a dead end public corridor is permitted provided it is not more than 6 m long.

Dead end corridors in Sentence (9) shall contain no door openings to service rooms containing fuel-fired appliances or rooms that may be considered a hazard.

A dead end public corridor is permitted in a business and personal services occupancy where,

(a) the dead end corridor,
   (i) serves an occupant load of not more than 30 persons,
   (ii) is not more than 9 m long, and
   (iii) is provided with doors having self-closing devices, or
(b) there is a second and separate egress doorway from each room or suite not leading into a dead end corridor.
(11) A dead end public corridor is permitted in a business and personal services occupancy where,
   (a) the dead end corridor,
       (i) serves an occupant load of not more than 30 persons,
       (ii) is not more than 9 m long, and
       (iii) is provided with doors having self-closing devices, or
   (b) there is a second and separate egress doorway from each room or suite not leading into a dead end corridor.
Code Requirements

Provisions same for:
- Business and personal services (3.3.1.9.(11))
- Mercantile (3.3.1.9.(12))
- Low and medium hazard occupancy (3.3.1.9.(13))

(14) A dead end corridor is permitted in a high hazard industrial occupancy where there is a second and separate egress doorway from each room or suite not leading into a dead end corridor.

(15) Except as otherwise required by this Section, aisles shall be provided in conformance with the Fire Code made under the Fire Protection and Prevention Act, 1997.
3.3.1.10. Door Swing
(1) Except as permitted by Article 3.3.1.11., a door that opens into a corridor or other facility providing access to exit from a suite, or a room not located within a suite, shall swing on a vertical axis.

3.3.1.10. Door Swing
(2) Except as permitted by Article 3.3.1.11., a door that opens into a corridor or other facility providing access to exit from a room or suite shall swing in the direction of travel to the exit if the room or suite is used or intended for,

   (a) an occupant load more than 60,
   (b) a high hazard industrial occupancy, or
   (c) a hazardous classroom in an elementary or secondary school.
Every door that divides a corridor that is not wholly contained within a suite shall swing on a vertical axis in the direction of travel to the exit where the corridor provides access.

- an occupant load more than 60,
- a high hazard industrial occupancy,
- a hazardous classroom in an elementary or secondary school, or
- a Group B, Division 2 or 3 occupancy.
If a pair of doors is installed in a corridor that provides access to exit in both directions, the doors shall swing in opposite directions, with the door on the right hand side swinging in the direction of travel to the exit.
3.3.1.12. Doors and Door Hardware
(1) A door that opens into or is located within a public corridor or other facility that provides access to exit from a suite shall,
   (a) provide a clear opening of not less than 800 mm if there is only one door leaf,
   (b) in a doorway with multiple leaves, have the active leaf providing a clear opening of not less than 800 mm, and
   (c) not open onto a step.
Code Requirements

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(2) A door in an access to exit shall be readily openable in travelling to an exit without requiring keys, special devices or specialized knowledge of the door opening mechanism, except that this requirement does not apply to a door serving a contained use area, or an impeded egress zone, provided the locking devices conform to Sentence (6).

Code Requirements

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(2) A door in an access to exit shall be readily openable in travelling to an exit without requiring keys, special devices or specialized knowledge of the door opening mechanism, except that this requirement does not apply to a door serving a contained use area, or an impeded egress zone, provided the locking devices conform to Sentence (6).

Code Requirements

• Electric strikes
  • Permitted for access control (i.e. into a suite)
  • Not permitted to secure the direction of egress travel (i.e. out of a suite)
Code Requirements

(3) Except as permitted by Sentence (4), door release hardware shall be operable by one hand and the door shall be openable with not more than one releasing operation.

• Dead bolts permitted?
• Yes, but integrated with primary door opening mechanism

(4) An egress door from an individual dwelling unit or from a suite of residential occupancy is permitted to be provided with additional devices that require a releasing operation additional to the main door release hardware, provided the devices are readily operable from the inside without the use of keys, special devices or specialized knowledge.
(6) An egress door in an access to exit serving a contained use area or an impeded egress zone is permitted to be equipped with locking devices ...

(10) A door in an access to exit is permitted to be equipped with an electromagnetic locking device conforming to Sentence 3.4.6.15.(4), except that this permission does not apply to a door...
(a) in an elementary or secondary school,
(b) a door leading from a Group F, Division 1 occupancy, or
(c) except as provided in Sentence (11), requiring a latch release device by Article 3.3.2.6.

3.3.2.6. Doors
(1) A door equipped with a latching mechanism in an access to exit from a room or suite of assembly occupancy containing an occupant load more than 100 shall be equipped with a device that will release the latch and allow the door to swing wide open when a force not more than that specified in Sentence 3.8.3.3.(7) is applied to the device in the direction of travel to the exit.
3.3.2.6. Doors
(1) A door equipped with a latching mechanism in an access to exit from a room or suite of assembly occupancy containing an occupant load more than 100 shall be equipped with a device that will release the latch and allow the door to swing wide open when a force not more than that specified in Sentence 3.8.3.3.(7) is applied to the device in the direction of travel to the exit.

3.3.1.15. Curved or Spiral Stairs
(1) A curved or spiral stair is permitted in a stairway not required as an exit provided the stair has,
(a) treads with,
   (i) a minimum run not less than 150 mm, and
   (ii) an average run not less than 200 mm, and
(b) risers in conformance with Sentence 3.4.6.7.(2).
3.3.1.16. Capacity of Access to Exits

(1) The capacity of an access to exit shall be based on the occupant load of the portion of the floor area served.

(2) In an access to exit the required width of ramps with a slope not more than 1 in 8, doorways, and corridors shall be based on not less than 6.1 mm per person.
Code Requirements

Ontario 2006 Building Code

(3) In an access to exit the required width of a ramp with a slope more than 1 in 8 shall be based on not less than 9.2 mm per person.

Code Requirements

Ontario 2006 Building Code

(5) The capacity of stairs in an access to exit shall conform to the requirements for stairs in Article 3.4.3.2.(1) to (3).

Questions
3.4.1. General

3.4.1.1. Scope
(1) Exit facilities complying with this Section shall be provided from every floor area that is intended for occupancy.

3.4.1.2. Separation of Exits
(1) Except as permitted by Sentence (2), if more than one exit is required from a floor area, each exit shall be separate from every other exit leading from that floor area.

(2) If more than 2 exits are provided from a floor area, exits are permitted to converge in conformance with Sentence 3.4.3.1.(2), provided the cumulative capacity of the converging exits does not contribute more than 50% of the total required exit width for the floor area.
3.4.1.4. Types of Exit
(1) ... an exit from any floor area shall be one of the following, used singly or in combination:
   (a) an exterior doorway,
   (b) an exterior passageway,
   (c) an exterior ramp,
   (d) an exterior stairway,
   (e) a fire escape (conforming to Subsection 3.4.7.),
   (f) a horizontal exit,
   (g) an interior passageway,
   (h) an interior ramp, or
   (i) an interior stairway

3.4.1.7. Slide Escapes
(1) A slide escape shall not be erected on any building as a required exit, but is permitted to be provided as an additional egress facility if unusual hazards are foreseen.
3.4.2.1. Minimum Number of Exits

(1) Except as permitted by Sentences (2) to (4) and (6), every floor area intended for occupancy shall be served by at least 2 exits.

(2) A floor area in a building not more than 2 storeys in building height, is permitted to be served by one exit provided the total occupant load served by the exit is not more than 60 and,

(a) in a floor area that is not sprinklered, the floor area and the travel distance are not more than the values in Table 3.4.2.1.A., or
(b) in a floor area that is sprinklered,
   (i) the travel distance is not more than 25 m, and
   (ii) the floor area is not more than the value in Table 3.4.2.1.B.
The requirements of Sentences (1) and (2) are permitted to be waived for dwelling units having access to exit conforming to Sentences 3.3.4.4.(1) to (4) and (9).

Exits are not required directly from rooftop enclosures that are provided with access to exits in conformance with Sentences 3.3.1.3.(5) and (6).

Every room containing an assembly occupancy serving a hotel, and located in the building containing the hotel, shall be provided with no fewer than,

(a) 3 separate egress doorways from the room where the occupant load is more than 600 persons, and
(b) 4 separate egress doorways from the room where the occupant load is more than 1000 persons.

Each egress doorway in Sentence (6) shall be considered as contributing not more than,

(a) one third of the required width where 3 egress doorways are required, and
(b) one fourth of the required width where 4 egress doorways are required.
3.4.2.2. Mezzanine Exiting

(1) Except as permitted by Sentences (2) to (4), a mezzanine shall be provided with exits on the same basis as required for floor areas by this Section.

(2) A mezzanine need not conform to Sentence (1) provided Article 3.2.8.2. does not require it to terminate at a vertical fire separation.

(3) In a floor area that is not sprinklered...

(4) In a floor area that is sprinklered...

...where Article 3.2.8.1. does require it to terminate at a vertical fire separation provided the total occupant load of the mezzanine is not more than 60 and,

3.4.2.3. Distance between Exits

(1) Except as provided in Sentence (2), the least distance between 2 required exits from a floor area shall be,

(a) one half the maximum diagonal dimension of the floor area, but need not be more than 9 m for a floor area having a public corridor, or
3.4.2.3. Distance between Exits

(1) Except as provided in Sentence (2), the least distance between 2 required exits from a floor area shall be,
(a) one half the maximum diagonal dimension of the floor area, but need not be more than 9 m for a floor area having a public corridor; or
(b) one half the maximum diagonal dimension of the floor area, but not less than 9 m for all other floor areas.

(3) The minimum distance between exits referred to in Sentence (1) shall be the shortest distance that smoke would have to travel between the exits, assuming that the smoke will not penetrate an intervening fire separation.
(2) Exits need not comply with Sentence (1) where,
(a) the floor area is divided so that not less than one third of the floor area is on each side of the fire separation, and
(b) it is necessary to pass through the fire separation to travel from one exit to another exit.

3.4.2.4. Travel Distance
(1) Except as permitted by Sentence (2), for the purposes of this Subsection, travel distance means the distance from any point in the floor area to an exit measured along the path of travel to the exit.

(2) The travel distance from a suite or a room not within a suite is permitted to be measured from an egress door of the suite or room to the nearest exit provided,
(a) the suite or room is separated from the remainder of the floor area by a fire separation,
(i) having a fire-resistance rating not less than 45 min in a floor area that is not sprinklered, or
(ii) that is not required to have a fire-resistance rating, in a floor area that is sprinklered, and
(b) the egress door opens onto,
(i) an exterior passageway,
(ii) a corridor used by the public that is separated from the remainder of the floor area in conformance with the requirements in Article 3.3.1.4. for the separation of public corridors, or
(iii) a public corridor that is separated from the remainder of the floor area in conformance with Article 3.3.1.4.
(3) Travel distance to an exit shall be not more than 50 m from any point in a service space referred to in Sentence 3.2.1.1.(9).

(4) If there is a firewall in an elementary or secondary school, the travel distance shall not be measured to a door in the firewall, but shall be measured to an exterior exit door or an exit door to a stairway.

3.4.2.5. Location of Exits

(1) Except as permitted by Sentences (2), 3.2.8.4.(4) and 3.3.2.4.(13) to (16), if more than one exit is required from a floor area, the exits shall be located so that the travel distance to at least one exit shall be not more than,
3.4.2.5. Location of Exits

(1) Except as permitted by Sentences (2), 3.2.8.4.(4) and 3.3.2.4.(13) to (16), if more than one exit is required from a floor area, the exits shall be located so that the travel distance to at least one exit shall be not more than,
   (a) 25 m in a high hazard industrial occupancy,
   (b) 40 m in a business and personal services occupancy,
   (c) 45 m in a floor area that contains an occupancy other than a high hazard industrial occupancy, provided it is sprinklered,

(d) 105 m in any floor area, served by a public corridor, in which rooms and suites are not separated from the remainder of the floor area by a fire separation, provided,
   (i) the public corridor is not less than 9 m wide,
   (ii) the ceiling height in the public corridor is not less than 4 m above all floor surfaces,
   (iii) the building is sprinklered.
(d) 105 m in any floor area, served by a public corridor, in which rooms and suites are not separated from the remainder of the floor area by a fire separation, provided,

(i) the public corridor is not less than 9 m wide,
(ii) the ceiling height in the public corridor is not less than 4 m above all floor surfaces,
(iii) the building is sprinklered,
and

(iv) not more than one half of the required egress doorways from a room or suite open into the public corridor if the room or suite is required to have more than one egress doorway,
(e) 60 m in any storage garage that conforms to the requirements of Article 3.2.2.83, and
(f) 30 m in any floor area other than those referred to in Clauses (a) to (e).

(2) Except for a high hazard industrial occupancy, Sentence (1) need not apply if exits are placed along the perimeter of the floor area and are not more than 60 m apart, measured along the perimeter, provided each main aisle in the floor area leads directly to an exit.
(3) Exits shall be located and arranged so that they are clearly visible or their locations are clearly indicated and they are accessible at all times.

3.4.2.6. Principal Entrance

(1) For the purposes of this Section, at least one door at every principal entrance from ground level shall be designed in accordance with the requirements for exits.

3.4.3.1. Exit Width Based on Occupant Load

(1) For the purpose of determining the aggregate width of exits, the occupant load of every room or floor area shall be determined in conformance with Subsection 3.1.17.

(2) Except as permitted by Sentence 3.4.3.2.(4), the required exit width shall be cumulative if 2 or more exits converge.

3.4.3.2.(4) Except as required by Sentence (5), the required exit width need not be cumulative in an exit serving 2 or more floor areas located one above the other.
3.4.3.2. Exit Width

(1) Except as permitted by Sentence (3), the minimum aggregate required width of exits serving floor areas intended for assembly occupancies, residential occupancies, business and personal services occupancies, mercantile occupancies, and industrial occupancies shall be determined by multiplying the occupant load of the area served by:

(a) 6.1 mm per person for ramps with a slope of not more than 1 in 8, doorways, corridors and passageways,

(b) 8 mm per person for a stair consisting of steps whose rise is not more than 180 mm and whose run is not less than 280 mm, or
(a) 6.1 mm per person for ramps with a slope of not more than 1 in 8, doorways, corridors and passageways,
(b) 8 mm per person for a stair consisting of steps whose rise is not more than 180 mm and whose run is not less than 280 mm, or
(c) 9.2 mm per person for,
   (i) ramps with a slope of more than 1 in 8, or
   (ii) stairs, other than stairs conforming to Clause (b).

• If door is 915 mm
  • Serves 150 p
  • Stair has to be at least:
    • 1200 mm wide at 8 mm/p, or
    • 1380 mm at 9.2 mm/p
  • Stair at 1100 mm
    • 137 p at 8 mm/p
    • 119 p at 9.2 mm/p
(2) The minimum aggregate width of exits serving floor areas intended for a care or detention occupancy shall be determined by multiplying the occupant load of the area served by 18.4 mm per person.

(3) The minimum aggregate width of means of egress serving a Group A, Division 4 occupancy shall be determined by multiplying the occupant load of the area served by:

(a) 1.8 mm per person for,
(i) aisles,
(ii) stairs other than exit stairs, and
(iii) ramps and passageways in vomitories and exits, and
(b) 2.4 mm per person for exit stairs.

(6) If more than one exit is required, every exit shall be considered as contributing not more than one half of the required exit width.
(7) The width of an exit shall be not less than,
(a) 1100 mm for corridors and passageways,
(b) 1100 mm for ramps not serving patients’ or residents’ sleeping rooms,
(c) 1100 mm for stairs, not serving patients’ or residents’ sleeping rooms, that serve more than two storeys above the lowest exit level or more than one storey below the lowest exit level,
(d) 900 mm for stairs, not serving patients’ or residents’ sleeping rooms, that serve not more than two storeys above the lowest exit level or not more than one storey below the lowest exit level,

Serve not more than two storeys above the lowest exit level
or
Not more than one storey below the lowest exit level
(e) 1650 mm for stairs and ramps serving patients’ or residents’ sleeping rooms,
(f) 1050 mm for doorways serving patients’ or residents’ sleeping rooms, and
(g) 790 mm for doorways not serving patients’ or residents’ sleeping rooms.

3.4.3.4. Exit Width Reduction

(1) Except as permitted by Sentences (2) to (4), no fixture, turnstile or construction shall project into or be fixed within the required width of an exit.

(2) Exit doors shall be hung so that, when open, they shall neither diminish nor obstruct the required width of the exit by more than 50 mm for each door leaf.

• Can obstruct required width by 50 mm
• Watch for requirements for “clear width”

(3) Swinging doors in their swing shall not reduce the required width of exit stairs or landings to less than 750 mm or reduce the width of an exit passageway to less than the minimum required width.
(4) Handrails and construction below handrails are permitted to project into the required width of means of egress but the projections shall be not more than 100 mm on each side of the required width.
4. Handrails and construction below handrails are permitted to project into the required width of means of egress but the projections shall be not more than 100 mm on each side of the required width.

3.4.3.5. Headroom Clearance

(1) Except as permitted by Sentences (2) to (4), every exit shall have a headroom clearance of not less than 2100 mm.
(2) The headroom clearance for stairways measured vertically above any landing or the nosing of any stair tread shall be not less than 2050 mm.
(3) Except as permitted by Sentence (4), the headroom clearance for doorways shall be not less than 2030 mm.
(4) No door closer or other device shall be installed so as to reduce the headroom clearance of a doorway to less than 1980 mm.

3.4.4.2. Exits through Lobbies

(1) Except as permitted by Sentence (2), no exit from a floor area above or below the first storey shall lead through a lobby.
3.4.4.2. Exits through Lobbies

(1) Except as permitted by Sentence (2), no exit from a floor area above or below the first storey shall lead through a lobby.

(2) Not more than one exit from a floor area is permitted to lead through a lobby provided,

(a) the lobby floor is not more than 4.5 m above grade,
(b) the path of travel through the lobby to the outdoors is not more than 15 m,
(c) the adjacent rooms or premises having direct access to the lobby do not contain a residential occupancy or an industrial occupancy, except that dwelling units may open directly onto the lobby where,
   (i) from the interior of the exit stair that opens onto the lobby there is alternate means of egress not leading through the lobby and such means of egress is entirely within the same storey as the lobby, or
   (ii) the floor area is sprinklered,
(d) except as required by Clause (g), the lobby is not located within an interconnected floor space other than as described in Sentence 3.2.8.2.(6), …

(g) that if the exit serves a hotel, the lobby is not located within an interconnected floor space.

(e) the lobby conforms to the requirements for exits, except that,

(i) rooms other than service rooms and storage rooms are permitted to open onto the lobby,

(ii) the fire separation between the lobby and a room used for the sole purpose of control and supervision of the building need not have a fire-resistance rating.

(iii) the fire separation between the lobby and adjacent occupancies that are permitted to open onto the lobby need not have a fire-resistance rating provided the lobby and adjacent occupancies are sprinklered, and

(iv) passenger elevator entrances are permitted to open onto the lobby provided the elevator entrance doors are designed to remain closed except while loading and unloading,
(f) a fire separation, constructed in accordance with Sentence 3.4.4.1.(1), is maintained between the lobby and any exit permitted by this Sentence to lead through the lobby.

3.4.4.4. Integrity of Exits

(1) A fire separation that separates an exit from the remainder of the building shall have no openings except for,
(a) standpipe and sprinkler piping,
(b) electrical wires and cables, totally enclosed non-combustible raceways and non-combustible piping that serve only the exit,
(c) openings required by the provisions of Subsection 3.2.6.,
(d) exit doorways, 
(e) wired glass and glass block permitted by Article 3.1.8.14., and  
(f) a sprinkler protected glazed wall assembly conforming to Article 3.1.8.18.

(4) A fuel-fired appliance shall not be installed in an exit.  
(5) An exit shall not be used as a plenum for a heating, ventilating or air-conditioning system.  
(6) An exit shall be designed for no purpose other than for exiting, except that an exit is permitted also to be designed to serve as an access to a floor area.  
...(10) In elementary and secondary schools, an exit shall be designed so that it does not serve as an access from one portion of a floor area to another portion of the same floor area.

(7) A service room shall not open directly into an exit.  
(8) Storage rooms, washrooms, toilet rooms, laundry rooms and similar ancillary rooms shall not open directly into an exit.  
(9) Service spaces referred to in Sentence 3.2.1.1.(9) shall not open directly into an exit.
Code Requirements

- Fire separations
- Slip resistance
- Number of risers
- Landings
- Handrails
- Guards
- Ramps
- Treads and risers
- Exit signs
Code Requirements

- Fire separations
- Slip resistance
- Number of risers
- Landings
- Handrails
- Guards
- Ramps
- Treads and risers
- Exit signs

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3.4.6.7. Treads and Risers

(1) Except as permitted for dwelling units and by Sentence 3.4.7.5.(1) for fire escapes, steps for stairs shall have a run of not less than 255 mm and not more than 355 mm between successive steps.
3.4.6.7. Treads and Risers
(2) Steps for stairs referred to in Sentence (1) shall have a rise between successive treads not less than 125 mm and not more than 200 mm.
3.4.6.7. Treads and Risers
(3) Treads and risers in every exit stair, except a fire escape stair, shall have uniform run and rise in any one flight, and shall not alter significantly in run and rise in successive flights in any stair system.

3.4.6.10. Doors
(1) The distance between a stair riser and the leading edge of a door during its swing shall be not less than 300 mm.
3.4.6.10. Doors
(2) No exit door shall open directly onto a step except that, if there is danger of blockage from ice or snow, an exit door is permitted to open onto not more than one step which shall be not more than 150 mm high.
(3) Exit doors shall be clearly identifiable.
(4) No door leaf in an exit doorway with more than one leaf shall be less than 600 mm wide.

3.4.6.15. Door Release Hardware
(1) Except for dwelling units, and except for devices on doors serving a contained use area or an impeded egress zone designed to be released in conformance with Article 3.3.1.12., and except as permitted by Sentence (4), locking, latching and other fastening devices on every exit door shall permit the door to be readily opened from the inside with not more than one releasing operation and without requiring keys, special devices or specialized knowledge of the door opening mechanism.
3.4.6.15. Door Release Hardware

(1) Except for dwelling units, and except for devices on doors serving a contained use area or an impeded egress zone designed to be released in conformance with Article 3.3.1.12., and except as permitted by Sentence (4), locking, latching and other fastening devices on every exit door shall permit the door to be readily opened from the inside with not more than one releasing operation and without requiring keys, special devices or specialized knowledge of the door opening mechanism.

(2) If a door is equipped with a latching mechanism, a device that will release the latch and allow the door to swing wide open when a force of not more than 90 N is applied to the device in the direction of travel to the exit shall be installed on,
If a door is equipped with a latching mechanism, a device that will release the latch and allow the door to swing wide open when a force of not more than 90 N is applied to the device in the direction of travel to the exit shall be installed on:

(a) every exit door from a floor area containing an assembly occupancy having an occupant load more than 100,
(b) every door leading to an exit lobby from an exit stair shaft, and every exterior door leading from an exit stair shaft in a building having an occupant load more than 100, and

(c) every exit door from a floor area containing a high hazard industrial occupancy.

Except as required by Sentence 3.8.3.3.(7), every exit door shall be designed and installed so that, when the latch is released, the door will open under a force of not more than 90 N, applied at the knob or other latch releasing device.

- Barrier free door opening forces
  - Interior 22 N
  - Exterior 38 N
- Are exit doors in a barrier-free path of travel?
Electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on exit doors other than doors described in Sentence (5) provided,....
Except as permitted in Sentences (6) and (7), electromagnetic locks are not permitted to be installed on exit doors,
(a) described in Clause (2)(a), (b) or (c),
(b) serving an elementary or secondary school, or
(c) leading directly from a high hazard industrial occupancy.

Electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on exit doors other than doors described in Sentence (5) provided,...
(a) the building is equipped with a fire alarm system conforming to Subsection 3.2.4.,
(b) the locking device, and all similar devices in the access to exit leading to the exit door, are installed as ancillary devices to the fire alarm system and release immediately upon activation of,
(i) the alarm signal where a single stage fire alarm system is installed,
(ii) except as provided in Subclause (iii), the alert signal where a 2 stage fire alarm system is installed, or
(iii) the alarm signal of a 2 stage fire alarm system installed in a care or detention occupancy;
(c) the locking device releases immediately upon loss of power to the fire alarm control panel or loss of power controlling the electromagnetic locking mechanism and its associated auxiliary controls,
(d) the locking device releases immediately upon actuation of a manually operated switch readily accessible only to authorized personnel and located near the main entrance of the building or in the central alarm and control facility of Sentence 3.2.6.7.(1),
(e) the locking device releases immediately upon a fault being detected in the electrical circuit between the fire alarm control panel and the controller of the locking device,
(f) the locking device releases immediately upon the operation of a manual pull station for the fire alarm system located on the wall not more than 600 mm from the door.
(g) a legible sign having the words **EMERGENCY EXIT UNLOCKED BY FIRE ALARM** is permanently mounted on the door,
(h) the lettering on the sign required in Clause (g) is at least 25 mm high with a 5 mm stroke,

(i) upon release, the locking device must be reset manually by the actuation of the switch referred to in Clause (d),
(j) the operation of any by-pass switch, where provided for testing of the fire alarm system, causes an audible signal and a visual signal to be indicated at the fire alarm annunciator panel and at the monitoring station of Clause 3.2.4.7.(4) (a), and
(k) emergency lighting is provided at the doors.

3.4.6.17. Emergency Access to Floor Areas
(1) In a building more than 6 storeys in building height,
3.4.6.17. Emergency Access to Floor Areas

(1) In a building more than 6 storeys in building height, (a) except as permitted by Sentence (3), doors providing access to floor areas from exit stairs shall not have locking devices to prevent entry into,

(i) any floor area designated as an area of refuge,

(ii) floor areas located at intervals of 5 storeys or less, and

(iii) at least one of the three highest storeys,
3.4.6.17. Emergency Access to Floor Areas

(1) In a building more than 6 storeys in building height, (b) doors referred to in Clause (a) that provide access into the floor area shall be identified by a sign on the stairway side to indicate that they are openable from that side, and

(c) a master key to fit all door locking devices that are intended to prevent entry into a floor area from an exit stair shall be provided in a designated location accessible to fire fighters, or the door shall be provided with a wired glass panel not less than 0.0645 m$^2$ in area and located not more than 300 mm from the door opening hardware.

(2) If access to floor areas through unlocked doors is required by Clause (1)(a) or through electromagnetically locked doors as permitted by Sentence (3), it shall be possible for a person entering the floor area to have access through unlocked doors or through electromagnetically locked doors within the floor area to at least one other exit.
Electromagnetic locking devices may be installed on the doors providing access to floor areas from exit stairs as required by Clause (1)(a), provided all locking device release and signage provisions in Sentence 3.4.6.15.(4) are installed on both sides of the doors.
Design Options

- Scissor stairs
- Fire escapes
- Exterior fire stairs

Design Options

- Other options
  - Escape to the roof
  - Slides
  - Chutes
  - helicopter
Design Options

• Dual control descent device

Design Options

• Platform rescue system

Design Options

• NFPA 101: Different criteria than our Codes
• Performance based
  • Atrium: Smoke layer 6 ft (1830 mm) from floor for 1.5 times the calculated egress time or 20 minutes, whichever is greater
Questions

Thank You
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